



# Task Sheet

REU 2007



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**Date: 6/5/2007**

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**Major: Civil Engineering**

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**Mentor: Rakesh Gupta**

**Project Title: Wave Loading on Residential Structures**

Complete the following in consultation with your mentor. Use additional sheets as needed.

- A. Describe your mentor's overall project in one or two paragraphs. Use terms that can be understood by the average person, and avoid technical jargon.
- B. Describe your specific role in the project in two or three paragraphs.
- C. List your specific project tasks that you will complete by the end of the 9-week program.

Task sheet is due by 1 pm Tuesday June 5th. Submit one copy to the Dan Cox, one copy to your mentor, and retain one copy for your records.

A scale wooden residential structure has never been tested in a wave basin in order to determine loads occurring in various members. This payload project will change that, aiming to provide new experimental data about the stresses a timber frame building experiences when subjected to waves and/or surges. One of the long term goals of such projects is to improve building codes and other construction regulations regarding structures to be located in coastal and tsunami threatened areas. Currently, such codes are considered highly lacking, contributing to unnecessary loss of life in such disasters as the Indian Ocean Tsunami in 2004. Also the conclusions reached in this project could impact existing Hurricane building codes in the United States.

I will be assisting the project in various areas over the course of the 10-week REU program. In the first two weeks, I will be primarily involved in Literature Review in order to better understand the fundamental topics used in designing the experiment. This will include existing papers on wave loading on structures, timber connections, and material published by the Hawaii Building Department and by the Federal Emergency Management Agency in their Coastal Manual.

Starting in the third week, I will be assisting the project team with the setup of the prototype structure. Though the crux of the experiment will be performed on a 1:6 scale wooden, single-family residence, initial wave testing will be performed on a simplified wooden box frame. This is to test the loading sensors for proper functioning as well as to work out the method for mounting the scale models to the basin floor. Sensors will be placed in the connections between the box walls and the mounting plate of the structure, so that as waves contact the structure, the various compressive and uplifting forces can be measured. During this phase I will also be assisting in data acquisition while the experiments are being conducted.

Later in the project I will be conducting experiments relating to the incoming data, including the measured forces, displacements, and analyzing footage recorded on a high-speed camera. The high speed camera should prove to be a vital tool in aiding our understanding of the acquired data. Lastly, I will be involved in an experiment to determine forces sustained by connections that affix sheathing to roof trusses.